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Jan. 26, 1929



IS THIS BABY INTELLIGENT?

Psychologists Now Test Youngest Members of Family

(See page 43)

Vol. XV

No. 407

HENRY B. WARD
STATE UNIVERSITY

Skill Comes With Growth

Psychology

Some sorts of learning and behavior depend upon natural growth processes rather than training, it was determined by unique experiments upon identical girl twins performed by Dr. Arnold Gesell and Dr. Helen Thompson of the Yale Psycho-Clinic.

Twin girl babies were kept under observation from one month to eighteen months of age. They lived together in a nursery home. They were healthy, good-natured, and remarkable for their sameness.

"The apple cleft in two is not more twain than these two creatures, using the language of Shakespeare who was himself the father of twins," Dr. Gesell said in explaining that these identical twins have established a new method of study, known as "the method of co-twin control."

One twin was taught for 20 minutes daily over a period of six weeks how to climb stairs and play with

small red blocks. The other twin was not allowed even incidentally to do these things. At the end of the period when both were a year old, the trained Twin T was very proficient in stair climbing and the control Twin C could not scale the four-stair staircase even with assistance. But a week later Twin C, again given a chance, climbed right up without training or assistance. Two weeks of training given Twin C made her equal to Twin T in skill. Motion pictures of each twin at each test showed the investigators that Twin C climbed better at 55 weeks of age than Twin T did at 52 weeks. Although Twin T was trained three times longer and seven weeks earlier, this advantage was overcome by three weeks of added age on the part of Twin C. In playing with cubes the training of one twin gave no advantage in skill over her sister.

Such tests may have important influence on educational methods.

Drill and repetition may not be effective if given when the child has not developed sufficiently.

"Training somewhat hastens and perfects the manifestations of skill," said Dr. Gesell, "but it is well to recognize that all forms of skill can rest only on a solid basis of behavior capacities which are determined by natural growth processes. The fundamental problem of educational psychology is to bring training and natural maturity into the most fruitful relations."

The identity of the twins used in this novel experiment was remarkable. Not only were they indistinguishable in physical appearance but the patterning of the skin ridges of hands and feet were alike in detail. Mentally and tempermentally they were so nearly the same that out of 536 comparative tests, in 471 of them they were almost completely identical.

Science News-Letter, January 26, 1929

Ultraviolet in Country

Physics

The amount of ultraviolet light in the country is actually half again as great as in the city. This has been known or suspected in a general way for some time, but now scientific proof of it has been made by J. H. Shrader, H. H. Coblenz and F. A. Korff, working at the Baltimore Department of Health. The figure reported is the result of actual measurements, based on chemical tests. They were made in the center of the city, in nearby suburbs located about three miles from the city's center, and in the country on farms ten miles from the municipal center.

Measurements of the amount of dust polluting the air were made at the same spots. These showed that air pollution affects the amount of ultraviolet light. The pollution was heaviest in the city and diminished to a figure about one-sixth as great in the country. The amount of dust settled on the top of skyscrapers was less than the amount at the street level, and the amount of ultraviolet light on the top of the buildings was greater than that at the street level.

The kinds of dust polluting the air were examined. Carbon, in the form of tarry products, kept out more of the ultraviolet light than ordinary dust or street sweepings.

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Youngest Babies Help Solve Old Problem

Psychology

By EMILY C. DAVIS

Psychologists are calling on the very youngest babies to help solve one of the old, unsolved riddles of life: Which is more important, heredity or environment.

The youngest babies, who have not had a chance to step out into the world, are sought because they are the best evidence of what heredity makes of a human being before environment takes a hand at changing him. After a while the same baby can be given more tests, and it will be possible to compare his achievements "before and after" and thus show what his environment is doing to him.

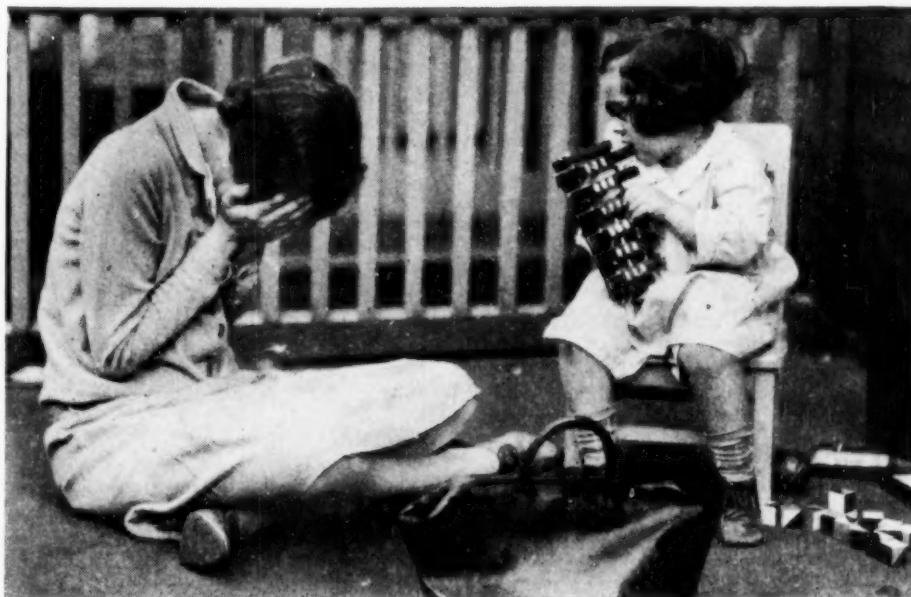
The idea sounds simple. But carrying out the plan is just becoming possible, because an infant's mental development is not easily observed and understood.

Only recently Dr. Mandel Sherman made experiments at the University of Chicago showing that when a baby cries it is just a matter of chance that an adult who comes into the room will read the baby's expression aright. A baby's facial signals when he is angry, frightened, or has a pin sticking into him are all, as the experiment showed, confusingly similar to the average onlooker.

Gradually, psychologists, led by the pioneer work of Dr. Arnold Gesell at Yale, have traced the development of intelligence back to its early stages when it is shown by grasping a rubber toy. Probing still farther back, to the very first month of life, they are less certain, but they believe that intelligence is displayed in such simple ways as paying attention to a voice or following a ball with interested eyes.

Not only do the youngest babies show their intelligence or lack of it, but they display personalities, and these personalities are being observed with scientific precision. In short, the youngest babies, that for thousands of years have been telling the world about themselves in a sign language that nobody tried to understand, are now being given the same intensive scientific attention as Fabre's beetles and Maeterlinck's bees. And the babies are proving as surprising as the bugs.

In one hospital crib lies young Edward, aged four days. His face is as pink as his blanket, and he is yelling fiercely. Bustling about gently is a nurse who might pick him up and provide a diversion in a monotonous



THE PSYCHOLOGIST may pretend she is hurt, in order to test the sympathetic nature of the child

afternoon. But she doesn't. So Edward protests promptly and strenuously against the unsatisfactory conditions in this strange world.

In the next crib, a baby three days old, still known vaguely as Brother, accepts life in a much more pleasant manner. Brother is less lively than Edward, less responsive. The nurse, who is noting down facts about Edward's crying, says that at this moment Edward and Brother are displaying their personalities in rather characteristic fashion. Edward has started out in the world demanding attention steadily. Brother is quiet and stable.

The inevitable idea comes up that it would be worth while knowing whether these brand-new human beings will stick to their first attitudes toward life, or whether they will be changed entirely. That is just what Dr. Thomas V. Moore, psychologist at the Catholic University of America, at Washington, D. C., would like to determine. Under his direction a list of personality traits for babies under two weeks old has been devised, and the personality records of Edward, Brother, and 118 other boys and girls of their own age are filed away.

At this point dots should indicate the passing of two years and the story is brought up to date. Thirty-five of the babies can still be located in the city. Two young psychologists are appointed by Dr. Moore to follow

the babies to their homes and find out what environment had added to or subtracted from the original personalities of these children.

Does the child who was good natured at birth now share his toys cheerfully? Does the child who became noted as a crying baby now have temper tantrums? The infant who could not learn to feed—does he now have trouble in feeding himself? And the baby who jumped in her sleep—does she still display nervousness? Again the children are given a chance to display their personalities, as in the hospital days, while the psychologist sits by and writes the record. The visiting psychologist carries with her a black bag, and if the two-year-old displays interest in the bag, he is told to open it. How he plays with the blocks, airplane and the other toys inside the bag is noted by the psychologist, and as she makes suggestions she observes whether the child is reasonable, obedient, orderly, destructive, sympathetic, shy, nervous.

Results of this investigation show that environment has changed the babies so that their first attitudes toward life are no longer outstanding. The once quiet baby is very likely to howl when the toys have to be put back in the black bag, so that they can be shown to other little children. The assertive baby may have learned to co-operate with the world instead of fighting it. (Turn to next page)

Youngest Babies Help Solve Old Problem—Continued

In fact, the only trait that carried over consistently from infancy to two years in these thirty-five children turned out to be good looks. The perfect infant, with nicely shaped head and well proportioned features, usually fulfilled its promise of being a pretty child. The infant that was scrawny and that looked beautiful only to its partial mother was not particularly attractive at two years. Good looks, of course, are a physical trait, very little affected by environment. All the character traits observed in the children at the two ages differed so that they offer a strong argument that a child's personality is shaped more by environment than by heredity.

This indicates that the complacent old excuses, such as "Jimmy inherits his temper from his father," are not valid to any great extent. It means that parents are responsible for the traits developed by their children in a broader way than the average parent now realizes.

A Princeton biologist recently declared that the infant at birth is already tuned to a fast or slow rhythm of living. It is also known that the baby's tiny body and brain have certain limits of possible development. But allowing for these limitations, the baby can be shaped to almost any mold that its family decrees. For while the newest baby is a personality, he is a much more pliable personality than parents generally realize. And he is much more pliable in the first year of life than he is ever going to be later.

Suppose he experiences neglect, and gets no amusement, in that first year of life? Suppose he is fussed over all day? Or suppose he gets what he wants by crying for it regularly? Any one can predict what that baby is going to be like under any of these conditions after two or three years, because everybody has seen children who displayed the results of such treatment. But specialists, and other people too, are beginning to look differently at such children now. The difference is that now it is realized that these personalities, good or bad, are not the inevitable development of the child's heritage, but have been formed quite largely by the wisdom or shortsightedness of the baby's home training.

While one set of psychologists has been showing that babies' characters change and develop amazingly in the first two years of life, another psychologist at Catholic University, Dr. Paul H. Fursey, has begun to in-



PERSONALITY AT TWO AND A HALF. Marcia is interested in the funny bag of the visiting psychologist

vestigate whether intelligence is also influenced more by environment than by heredity. It has been shown in the past that children from superior homes are likely to be more intelligent than children from poorer homes, Dr. Fursey points out. But whether these children are born with a superior inheritance of brains or whether they are brighter because of home advantages is still debatable.

If babies from rich and poor homes could be given intelligent tests as soon as they arrive in the world, before they begin to be influenced by home conditions at all, this point could be soon settled. But babies under one month of age do not show signs of intelligence so clearly as they reveal personality. Apparently a baby's emotional equipment is active and its brain is ready to register impressions some time before the higher brain centers, where such impressions are interpreted, are in full function. One month is about the youngest age at which a baby's mentality shows significant signs that psychologists can read. Still, at one month a baby has not been mentally affected to any great extent by differences in its surroundings.

Using a new test for the mental development of babies, Dr. Fursey tested 277 infants at one month of age, born at a large city hospital. When the babies' mental attainments were compared with the social and economic status of their homes it was found that the babies from the best homes did not have superior alertness to the babies from the poorer homes. Yet older children from good homes do average higher in mental tests. In other words, Dr. Fursey explains, it appears that mental development, like personality, is something that parents

and homes can either build up or retard.

The mental test for babies used in this heredity versus environment investigation is something new in the measurement of the earliest signs of intelligence. Observing babies under one year of age, it is difficult to gauge exactly what stage of mental development is back of a child's spoon-throwing activities or his antagonism for his father's new hat. But a set of standards for measuring what the average baby should do and know at certain ages has been devised by two young psychologists working with Dr. Fursey. The scale, which is for babies from one month old to one year, is called the Linfert-Hierholzer Scale, after the two young women who made it, Miss H. E. Linfert and Miss Helen M. Hierholzer.

The differences in mental ability between a baby one month old and a baby twelve months old appear to be relatively as great as the difference between a primary school child and a university graduate, according to these two baby specialists. Which indicates that a baby must put in a busy first year, for all he looks so detached and sleeps so much of the time.

If a number of babies one month of age are shown a bright pink celluloid ring, almost two-thirds of them will display interest and curl their fingers about it when the ring is placed at their finger tips. No month-old babies have ever tried to put the ring into their mouths, the psychologists have found. At two months, about two youngsters in 100 will try to taste the ring. At four months of age, 30 per cent. of the run of babies have discovered that putting things in their mouths is a pleasing amusement.

At one month of age, just half of the babies object to the taste of salt when a spoon with a tiny bit of salt is placed to their lips. By two months, 74 per cent. of babies are aroused to annoyance by this experiment. Ninety-eight per cent. of the four-month-old babies cry at the taste of salt.

Some babies are really as remarkable as their families think, because babies do vary astonishingly on these mental tests. A nine-month-old baby that tries to build with blocks is doing something that only about 2 per cent. of the babies in this country would think of doing at his age. A nine months' old baby that doesn't try to get a spoon that falls on the floor is less alert than most of his contemporaries, for 92 per cent. of the nine-month-old babies (*Turn to next page*)

Babies—Continued

would go promptly after the spoon, and what is more, almost 50 per cent. of babies at even six months pass this test of mental development.

Evidence that environment counts for more than heredity is hopeful evidence, Dr. Fursey believes. Heredity is largely a matter of chance in this world, and attempts to improve racial stocks necessarily make slow progress. But a child's environment may be improved immediately and directly through the education of its parents and through general education of the public.

It is only about one generation ago that parents began to be introduced to brand-new ideas about spinach, tomato juice, cod liver oil, sunlight and other vital aids to a baby's physical well-being. The facts about a baby's mental and emotional development are being discovered more slowly and with more uncertainty. But Dr. Fursey believes that when the scientific investigations can be organized for public use and put into understandable terms, mothers are ready to apply new knowledge on the mental well-being of babies.

What happens when families and homes allow young personalities to get askew is shown in the work of one of Dr. Fursey's student psychologists in an experiment at the Washington Child Research Center. This young psychologist, Miss R. F. O'Grady, is investigating the fantasy conversations that some children carry on half aloud as they fall asleep. By use of a telephonic apparatus, the psychologist listens in on the children's half-dreamy, rambling remarks and records them in a note book. Children who have this habit of talking themselves to sleep are generally problem children, whose everyday lives are not satisfactory and happy. The child compensates for an inadequate day by picturing himself as the center of an attractive situation.

One little girl studied by Miss O'Grady spends several hours at night before she drops off to sleep going over a story in which she is sick or injured and is the center of an anxious group of doctors, nurses, relatives and friends.

"A bad cut clear up to my ear," the little four-year-old murmurs. "I can't move; the bandages are so tight. The doctor is sewing it up a little bit. The doctor is smelly." And so on, with much detail of courage on her part and admiration and excitement all around her. (Turn to next page)

Einstein Extends Theory to Electricity

Physics

The new theory of Albert Einstein, which will soon be published by the Prussian Academy of Sciences, is said to be as exclusively mathematical as was his original theory of relativity and therefore will be comprehensible only to leading experts. But from what little has been given out in Berlin, the nature of the paper may be inferred.

According to the relativity theory the gravitational effect of a body exercised by its mass is confined to the gravitational field which surrounds it and within which space the body is consecutively affected. Space, consequently, is no absolute independent entity, but exists only in relation to the influencing body. The motion of bodies is not determined by any general force of gravitation drawing them together, but by the properties of gravitational fields, from which their motions can be determined.

Similarly every electrically charged body is surrounded by an electrical field, the charges and properties of

which determine the electrodynamics of the body. These could be derived from the known characteristics of the electrical field.

The older theories used to derive the laws of electrodynamics from hypothetical motions of the smallest particles of mass, thus regarding electrodynamics as a special part of mechanics. Modern physics tried to solve the difficulty by the reverse process; that is, by reducing mechanical changes to electrodynamical causes, regarding the motions of material masses as electrical processes. From this point of view mechanics became a special part of electrodynamics in general.

By the application of the mathematical laws of the gravitational field as developed by the relativity theory, Einstein is said to have settled the above question by applying them to the electrodynamic field, thus uniting both fields under identical laws.

According to this advance information, Einstein (Turn to next page)

Minute Current Reveals Stars' Heat

Astronomy

How an infinitesimal electric current, which would have to be amplified twenty billion times to make it a single ampere, is used to study the temperatures of the stars and planets was described recently by Dr. Seth B. Nicholson at the Carnegie Institution of Washington. Dr. Nicholson is an astronomer at the Institution's Mt. Wilson Observatory.

"The greatest success in measuring the heat received from the stars has been obtained with the thermocouple," he said. "A thermocouple consists of a junction of two elements which, when heated, generates an electric current, that can be measured with a galvanometer. The weight of a complete thermocouple with receivers one-half millimeter in diameter, including the connecting wires, is about one-thousandth that of a drop of water.

"A star, of the same color as the sun, which is just bright enough to be easily seen without a telescope, radiates on the whole United States about the same amount of heat as is radiated by the sun on one square yard. When the heat from such a star which falls on the 100-inch mirror of the Hooker telescope at Mount Wilson, the area of which is six square yards, is focused on the re-

ceiver of a thermocouple, the temperature of the receiver is increased about one-half-millionth of a degree Fahrenheit, and a current of electricity is made to flow through the galvanometer. The current thus generated is about one-twenty-billionth of an ampere. The currents produced in this way are proportional to the amount of heat received by the thermocouple, so that the deflection of the galvanometer when a star is focused on the thermocouple is a measure of the heat received from that star.

"The heat from many stars has been measured in this way, and of those measured more heat reaches the thermocouple from the red star Betelgeuse, in the constellation of Orion, than from any other. Much of the heat from stars and from the sun is absorbed by the earth's atmosphere. This absorption is especially large in the blue and violet light and when allowance is made for this loss we find that more heat reaches the earth from the blue star Sirius than from any other star."

Though the planets shine with reflected sunlight and are far cooler than the stars, the thermocouple can be used to measure (Turn to Page 52)

Einstein—Continued

has succeeded in devising mathematical formulas which bring under a single set of laws the phenomena of electricity and magnetism with those of gravitation. If so, it will be a great triumph of mathematical genius, for hitherto no scientist has been able to demonstrate such a relationship, although many have attempted to solve this perplexing problem.

The laws of the motion of bodies in the two fields are much alike in form. For instance, Newton's law of gravitation states that two bodies attract one another with a force proportional to their mass and inversely proportional to the square of the distance between them. Two bodies charged with opposite electricities behave in the same way; that is, they attract one another with a force proportional to their charge and inversely proportional to the square of the distance between them.

But there is this important difference between the two cases. It is possible to interpose a screen between two electrified or magnetized bodies that will cut off the force while nothing will interfere with the effect of gravitation. Every radio fan realizes

the effect of interposing sheets of metal or grids. But the pull of the sun on the earth acts through 93,000,000 miles of empty space and would act the same if this space were filled with iron or anything else.

Because gravitation acts the same between all bodies regardless of their composition or what is between them, Einstein did away with the idea of a hypothetical pulling "force" of gravitation and simply said that bodies came together because of the peculiar state of the space between them due to their presence and distance. His brief paper of 1915 generalized his theory of relativity of 1905 to include gravitation as well as mechanics and now it appears he has in another five-page paper extended the general theory to cover electricity and magnetism.

Science News-Letter, January 26, 1929

Experiments in cooking at New York State College of Home Economics show that best results with green vegetables are obtained by dropping the vegetables into boiling water and cooking them in a open kettle for the shortest possible time.

Frogs Learn Geometry

Zoology

Frogs are not so dumb as they look. They can learn a simple proposition in geometry, as that a square is not a triangle. And they will remember their lesson for a little while, at least if they are paid for it.

A European experimenter, S. Biedermann, has reported the results of tests on the learning capacity of frogs. He set square and triangular blocks in pairs before his squat pupils. One block would have a delectable insect attached to it, the other would have nothing. After a sufficient number of repetitions the frog would learn that one shape was associated with the idea of food, the other with the idea of remaining empty; and when both blocks were presented without the accustomed bait the frog would hop expectantly to the one that had hitherto served as his dinner-table.

A number of different species of frogs and toads were thus "educated." Tree frogs proved to be the most apt pupils.

Science News-Letter, January 26, 1929

Japan's land area is about that of the State of Montana.

Babies—Continued

Another evening the story is that she is quarantined for sickness. Lindbergh comes to see her and brings her medicine. Lindbergh's mother also comes at her request and says, "Haven't you got well yet? My! My!"

This four-year-old with an ingrowing idea comes from a wealthy home where governesses take scrupulous care of her. But she gets no taste of excitement or danger in her routine existence. So she has found a way for herself to put adventure into her quiet life—the only method at her command, the dream stories. Constant harping on the same morbid idea obviously is bad for the child, but the mother of the four-year-old who suddenly discovers such a habit firmly established is very much at sea as to what to do.

The psychologist did not tell her that if she had taken as much care of the baby's personality development as she has taken of physical welfare, this dream life would probably not have become so important to the little girl's life. There is no use bewailing spilt milk. But such cases point their warning unmistakably for other mothers to see. The warning, as Dr. Furley sums it up, is that the younger the baby, the more easily it may be changed—for better or worse.

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WASP STUDIES AFIELD

By PHIL and NELLIE RAU

\$3.00 net; cash with order

This volume of more than 400 pages, with 69 illustrations, is a distinct contribution to entomological knowledge, and is also a "nature book" of delightfully readable quality. Mr. and Mrs. Rau have watched the wasps at work and at play, and report their observations with a pretty combination of scientific accuracy and the sympathetic imagination without which science cannot attain its full possibilities of fruitfulness.

A special feature of this text, besides its study of species not hitherto fully reported and the description of an interesting series of experiments, is the concluding chapter on heredity, place memory, and instinct.

"Under the magic of their pens the wasps become more notable than most men, and skepticism as to the actual intelligence of these marvelous creatures is almost impossible. No lover of nature can afford to omit reading 'Wasp Studies Afield'." —Cleveland Plain Dealer.

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Position of Traffic Lights Important

Psychology

Automobile drivers who are color blind or color weak will be less likely to get into trouble when traffic signs and signals are standardized.

A report just completed by the committee of the American Engineering Council on traffic signs, signals, and markers, advocates standard usages throughout the country. While color blind people are not mentioned in the report, the adoption of many of these standards would obviously give a color blind driver additional clues that he could depend on.

When traffic lights at an intersection are arranged vertically, for example, the committee advocates always placing the red light at the top, below it the yellow light, if a yellow light is used, and at the bottom the green light. If the lights are set up in a row, the red should be at the left, the yellow in the middle, and the green on the right.

For the person with normal color reactions, this system has the advantage that the red light, meaning stop, is given the place of prominence. When traffic is thick, drivers may see the top light in a vertical set-up several seconds before the lower signal light can be seen. If the top signal is lighted, the driver is warned at the earliest possible

moment to slow down for the corner stop. When the lights are horizontal, the natural order of seeing them, based on reading experience, is to note the one at the left first. The color-blind person would depend even more heavily on the position of the lighted lamp than the normal person, and when this is made arbitrary, he would have a safe guide.

Use of the words "Go," "Caution," and "Stop," on the luminous signals has not been suggested in the report. These may have been a help to the color-blind driver, but the present tendency is to reduce the amount of reading that a driver must do to a safe minimum.

The plan of having the different colored lights shaped differently is another sort of first-aid to the color-blind that has apparently been discarded. This system was tried out in New Orleans, where the green light was diamond shaped, the yellow light oblong, and the red light a circle.

The question of what shades of red and green light can best be distinguished by both color-blind and normal eyes has been settled by experiments which showed that red-orange and blue-green, the bluer the better, are the most clearly distinguished. The usual type of color-

blindness results in confusion of two sequences of colors. Red, orange, and yellow all appear yellow or brown. Blue-green and blue are taken for blue. There is no difficulty in distinguishing the colors that appear yellow from the colors that appear blue, unless they are very pale tints, but yellow and red lights may be confused and some red lights, instead of crying stop to the color blind, are practically invisible.

Since about four per cent. of men and a somewhat smaller percentage of women are color blind, and since many other people are weak on their ability to distinguish colors, there are several million people in this country who require all the help possible in making traffic signals unmistakable. In some cities, the color blind driver is refused a license, if he is detected. But pedestrians as well as drivers are expected to read traffic signals and conform to crossing regulations. Moreover, it has been pointed out by psychologists that the normal eye at certain angles of vision has the same difficulty in distinguishing colors as the color weak person, and at times, the automobile driver inevitably gets his view of the signals from one of these confusing angles.

Science News-Letter, January 26, 1929

"Carnegie" Reaches Peru

Exploration

Despite unfavorable winds which drove her from the course after leaving Easter Island on December 12, the non-magnetic ship "Carnegie" reached Callao, Peru, on January 14, according to radio dispatches to the Carnegie Institution of Washington, owners of the vessel, through Science Service. This floating scientific laboratory is now on a three-year cruise during which most of the oceans of the world will be visited.

Even though blown off the planned course, all the desired observations of the earth's magnetism and electricity were made, Capt. V. P. Ault reported. On the part of the cruiser from Balboa to Easter Island and thence to Callao, twenty-three samples of the ocean bottom were obtained. Those from Easter Island to longitude 95 degrees west proved to consist of red clay and volcanic mud. Captain Ault expects to sail from Callao on February 3 for Papeete, Tahiti.

Science News-Letter, January 26, 1929

Ancient Plants in Pacific Islands

Botany

Seeds of American plants, or parts of plants with the seeds still clinging to them, probably made a long emigrant voyage southward by water millions of years ago, and their descendants are still growing in the islands of the South Seas.

This is the picture presented by Dr. Forest B. H. Brown, botanist of the Bernice P. Bishop Museum of Honolulu, as a result of his studies on plants of the dogwood family growing in the Marquesas and neighboring islands. The route would be impossible today, for ocean currents do not set southward from the Gulf of Mexico, and Central America and the Isthmus of Panama bar the way into the Pacific. But during Cretaceous times, when dinosaurs still walked the earth, there was open sea where the land link now binds the continents together, and Dr. Brown is of the opinion that much seed-bearing plant material then drifted down the Mississ-

sippi, across the Gulf, through this strait and so into their great adventure southward.

Such a voyage route would account, in the opinion of the Hawaiian botanist, for the presence on the island of Rapa of the plant known as Lautea, which is a primitive relative of the American dogwoods and the only representative of its family ever found in the South Pacific islands. The American members of the family that stayed at home have evolved into more advanced forms, but fossils have been found in New Jersey that prove the presence of Lautea-like forms here some forty millions of years ago.

Associated with this far-from-home dogwood, Dr. Brown reports, are other primitive plants, including a creeping fern, which are abundantly represented in American fossil beds of Cretaceous age, distributed all the way from Greenland to the Gulf of Mexico. *Science News-Letter, January 26, 1929*

The Origin of Cannibalism

Ethnology

E. HANBURY HANKIN in *The Cave Man's Legacy* (Dutton):

How did cannibalism arise? Why should primitive man be distinguished from apes and monkeys by his addiction to this repulsive practice?

In seeking for a possible answer to this question, let us first make a guess as to early man's mode of fighting. It is recorded of the Irish Celts that they used to eat their enemies while keeping the heads as trophies. Also it is said that "In some cases the victor tore the features with his teeth as did the Prince of Leinster in Fitzstephen's time." Similarly, according to Dr. N. A. Dyce Sharp, an angry gorilla has been known to tear a man into ribbons. Our earliest human ancestor, if he lacked the gorilla's strength, probably rivalled both him and the Prince of Leinster in his capacity for hating his enemies. We can imagine him biting and tearing his enemy, and even his dead enemy, with his teeth. He had not yet elaborated flint weapons and, for a certain period, his teeth must have been his chief weapon of offence, as is the case with children of to-day. He had a very servicable lower jaw, far larger than ours, if we may judge from the Piltdown and Heidelberg fossils. The use of his teeth in biting and tearing the enemy would naturally lead to tasting blood and thence, by an easy transition, to eating human flesh.

If cannibalism had this origin, and if a man was chosen to be a leader owing to his proficiency in brutal fighting, and if such a leader after his death was deified, his followers might honour him by putting enemy prisoners to death in front of his grave or shrine in the way that he did when fighting. The following facts supply very slight evidence in favour of this suggestion as to the origin of human sacrifice:

In Greece, a vase painting has been discovered that shows a Thracian tearing a child with his teeth in the presence of the god.

In Crete, "in the Dionysic rites . . . in order to be identified with the god who had himself been torn by Titans, the worshipper tore and ate the raw flesh of a bull or goat. But occasionally a human victim represented the god and was similarly treated."

In India, with the Khonds, "a girl representing the goddess Tari was sacrificed and torn limb from limb by the worshippers."

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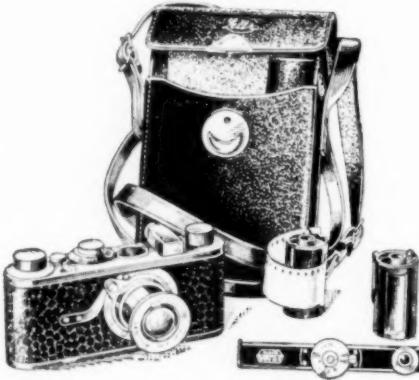
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According to Porphyry: "In Chios likewise they sacrificed a man to Omadius Bacchus; the man being for this purpose torn in pieces; and the same custom, as Euelpis Caryotius says, was adopted in Tenedos."

It may be explained that originally the sacrificed man or animal was merely a victim. Later, the sacrifice came to be regarded as sacred or even as part of the god.

The fact that religious cannibalism is almost always confined to eating enemies is in favour of the above suggestion.

Another suggestion may be made. If, as is highly probable, primitive man suffered from a restricted food supply, cannibalism may have appealed to him as a welcome means of avoiding hunger.

Science News-Letter, January 26, 1929

CLASSICS OF SCIENCE:

Darwin on Orchids

Biology

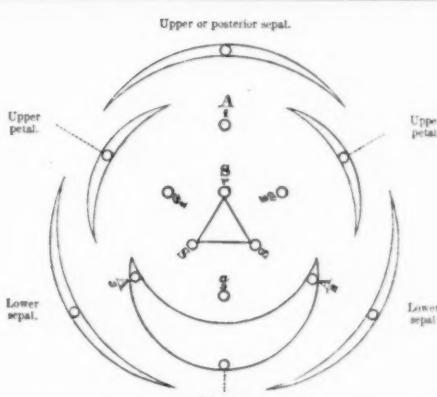
Can you identify in the flower the fifteen organs which Darwin found to make up, in various modifications, the typical structure of the orchid blossom?

ON THE VARIOUS CONTRIVANCES BY WHICH BRITISH AND FOREIGN ORCHIDS ARE FERTILISED BY INSECTS, and on the Good Effects of Intercrossing. By Charles Darwin, M. A., F. R. S., etc., London, 1862.

Diversity of Adaptations

I have now nearly finished this too lengthy volume. It has, I think, been shown that Orchids exhibit an almost endless diversity of beautiful adaptations. When this or that part has been spoken of as contrived for some special purpose, it must not be supposed that it was originally always formed for this sole purpose. The regular course of events seems to be that a part which originally served for one purpose, by slow changes becomes adapted for widely different purposes. To give an instance: in all the Ophreæ, the long and nearly rigid caudicle manifestly serves for the application of the pollen-grains to the stigma, when the pollinium attached to an insect is transported from flower to flower; and the anther opens widely that the pollinium may be easily withdrawn; but in the Bee Ophrys, the caudicle, by a slight increase in length, and decrease in thickness, and by the anther opening a little more widely, becomes specially adapted for the very different purpose of self-fertilisation, through the combined aid of the gravity of the pollen-mass and the vibration of the flower. Every gradation between these two states would be possible—of which we have seen partial proof in *O. arachnites*.

Again the elasticity of the pedicel of the pollinium in some Vandæa is adapted to free the pollen-masses out of their anther-cases; but by further slight modifications, the elasticity of the pedicel becomes specially adapted to shoot out the pollinia to a distance. The great cavity in the labellum of many Vandæa serves to attract insects, but in *Mormodes ignea* it is greatly reduced in size, and only serves to keep the labellum in its proper position on the summit of the column. From the analogy of many plants we may infer that a long spur-like nectary is primarily adapted to secrete and hold a store of nectar; but in many Orchids it has so far lost this function as only to contain fluid between its two coats. In these Or-



SECTION OF THE FLOWER OF AN ORCHID. The little circles show the position of the spiral vessels.

SS. Stigmas; Sr, stigma modified into the rostellum.

A₁. Fertile anther of the outer whorl; A₂ A₃, anthers of the same whorl combined with the lower petal, forming the labellum.

A₁ a₂. Rudimentary anthers of the inner whorl (fertile in *Cypripedium*), generally forming the clinandrum; a₃, third anther of the same whorl, when present, forming the front of the column.

chids, in which the nectary contains both free nectar and fluid in the inter-cellular spaces, we can see how a passage from one state to the other could have been effected, namely, by less and less nectar being secreted from the inner membrane, and more and more being retained within the inter-cellular spaces. Other analogous cases could be given.

Although an organ may not have been originally formed for some special purpose, if it now serves for this end we are justified in saying that it is specially contrived for it. On the same principle, if a man were to make a machine for some special purpose, but were to use old wheels, springs and pulleys, only slightly altered, the whole machine, with all its parts, might be said to be specially contrived for that purpose. Thus throughout nature almost every part of each living being has probably served, in a slightly modified condition, for diverse purposes, and has acted in the living machinery of many ancient and distinct specific forms.

In my examination of Orchids, hardly any fact has so much struck me as the endless diversity of structure—the prodigality of resources—for gaining the very same end, namely, the fertilisation of one flower by the pollen of another. The fact to a certain extent is intelligible on the principle of natural selection. As all

the parts of a flower are co-ordinated, if slight variations in any one part are preserved from being beneficial to the plant, then the other parts will generally have to be modified in some corresponding manner. But certain parts may not vary at all, or may not vary in the simplest corresponding manner, and these variations, whatever their nature may be, which will bring all the parts into more perfect harmony with each other, will be seized on and preserved by natural selection.

To give a simple illustration: in many Orchids the ovary (but sometimes the foot-stalk) becomes for a period twisted, causing the labellum to hang downwards, so that insects can easily visit the flower; but from slow changes in the form and position of the petals, or from new sorts of insects visiting the flower, it might become advantageous to the plant that the labellum should resume its normal upward position, as is actually the case with *Malaxis paludosa*; this change, it is obvious, might be simply effected by the continued selection of varieties which had their ovary a little less twisted; but if the plant only afforded varieties with the ovary more twisted, the same end could be attained by their selection until the flower had turned completely round on its axis: this seems to have occurred with the *Malaxis*, for the labellum has acquired its present upward position, and the ovary is twisted to excess.

Again, we have seen that in most Vandæa there is a plain relation between the depth of the stigmatic chamber and the length of the pedicel, by which the pollen-masses are inserted; now if the chamber became slightly less deep from any change in the form of the column or any other unknown cause, the shortening of the pedicel would be the simplest corresponding change; but if the pedicel did not happen to vary in length, any the slightest tendency to an upward curvature from elasticity as in *Phalaenopsis*, or to a backward hygrometric movement as in one of the *Maxillarias*, would be preserved, and the tendency would be continually augmented by selection; thus the pedicel, as far as its action is concerned, would be modified in the same manner as if it had been shortened. Such processes carried on during many thousand generations (*Turn to next page*)

Darwin on Orchids—Continued

in various ways, with the several parts of the flower, would create an endless diversity of coadapted structures for the same general purpose. This view affords, I believe, the key which partly solves the problem of the vast diversity of structure adapted for closely analogous ends in many large groups of organic beings.

Ingenuity of Nature

The more I study nature, the more I become impressed with ever-increasing force with the conclusion that the contrivances and beautiful adaptations slowly acquired through each part occasionally varying in a slight degree but in many ways, with the preservation or natural selection of those variations which are beneficial to the organism under the complex and ever-varying conditions of life, transcend in an incomparable degree the contrivances and adaptations which the most fertile imagination of the most imaginative man could suggest with unlimited time at his disposal.

The use of each trifling detail of structure is far from a barren search to those who believe in natural selection. When a naturalist casually takes up an organic being, and does not study its whole life (imperfect though that study will ever be), he naturally doubts whether each trifling point can be of any use, or indeed whether it be due to any general law. Some naturalists believe that numberless structures have been created for the sake of mere variety and beauty—much as a workman would make a set of different patterns. I, for one, have often and often doubted whether this or that detail of structure could be of any service; yet, if of no good, these structures could not have been modeled by the natural preservation of useful variations; such details could only be vaguely accounted for by the direct action of the conditions of life, or the mysterious laws of correlation of growth.

Value of Crossing

Considering how precious the pollen of Orchids evidently is, and what care has been bestowed on its organization and on the accessory parts—considering that the anther always stands close behind and above the stigma, self-fertilisation would have been an incomparably safer process than the trans-portal of the pollen from flower to flower. It is an astonishing fact that self-fertilisation should not have been an habitual occurrence. It apparently demonstrates to us that there must be

something injurious in the process. Nature thus tells us, in the most emphatic manner, that she abhors perpetual self-fertilisation. This conclusion seems to be of high importance and perhaps justifies the lengthy details given in this volume. For may we not further infer as probable, in accordance with the belief of the vast majority of the breeders of our domestic productions, that marriage between near relations is likewise in some way injurious—that some unknown great good is derived from the union of individuals which have been kept distinct for many generations?

Charles Darwin was born February 12, 1809, at Shrewsbury, England, and died April 19, 1882, at Down. He went to Edinburgh to study medicine at the age of 16, but was unsuited to that profession. At 19 he entered Cambridge University to study for holy orders. The year he graduated he set out on the five-year voyage on the *Beagle* which was his real preparation for his life's work. When he returned, at 28, he had already begun to make notes on the "Transmutation of Species," although publication of his theory waited on the experiments and verifications of the next 20 years. In the two decades following the publication of the "Origin of Species" a rapid succession of books appeared as the fruit of his earlier studies.

Science News-Letter, January 26, 1929

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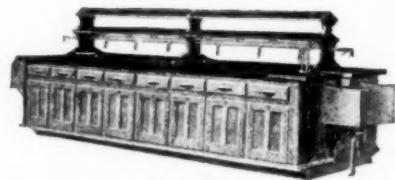
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“Old-Fashioned Winter” Real

Meteorology

When people talk of the “old-fashioned winter” with weather much more cold and snowy than we have in these degeneratd days, they are harking back to a series of severe winters that were experienced in England nearly two centuries ago, when the belief commenced. This is the conclusion announced by a famous British meteorologist, Dr. C. E. Brooks, in the current issue of *Nature*.

In expressing this opinion, Dr. Brooks disagrees with most meteorologists, who say that ideas of winters having been more severe in one's childhood is merely imaginary. One cause, they say, is that a snow-drift that would be waist high to a child would only be knee-high to a grown-up, and that when we recall the snowstorms of our childhood we

fail to allow for this difference in scale.

Such considerations may have been responsible for perpetuating the belief, says Dr. Brooks, but he has found evidence that English winters of about two centuries ago really were “old-fashioned.”

“There seems to have been a real change of climate about 1750,” he says. “Before that date there was a prolonged period, approaching a century, of abnormally dry weather in England. At the same time, weather in Norway was stormy and snowy; this and other facts suggest that our droughts were of the ‘anticyclonic’ type, which would be accompanied by generally cold weather in winter. This was the time of the great ‘frost fairs’ on the Thames, notably 1683-4, 1715-6, and 1739-40,

events which were likely to impress the memory of Londoners in a way which mere weather could not do, and which were kept in mind by the numerous ‘relics,’ such as engravings and ballads from printing presses set up on the frozen river. If the ‘old-fashioned winter’ ever had a real existence, no series of years is more likely to have given birth to the tradition.

“I would suggest, therefore, that the belief in the ‘old-fashioned Christmas’ may have originated in a series of severe winters in the late seventeenth and early eighteenth centuries, but that since then its vitality has been purely subjective, so that it now refers not to any definite period of time, but to the childhood of the speaker.”

Science News-Letter, January 26, 1929

Fossilized Brains Found

Paleontology

“The poor fish's brains were fossilized.”

That is not a part of a slang conversation; it is a statement of sober scientific fact, and a record of a really remarkable geological discovery.

Since water and fat make up the greater part of the brains of fishes, it would seem impossible for such things to be preserved in stone, yet in two periods of ancient time, such things have been preserved: in the Kentucky Mississippian, the period just before the great coal beds were formed, and in the Kansas coal measures themselves.

These beautiful little specimens of fossil brains are found in small, rounded nodules, often about an inch in diameter, which weather out from soft shale and break open by frost action. The break shows the head of a small hard-scaled fish containing, besides the brain, traces of nerves, blood-vessels, the eye, soft parts of the skull, and impressions of the bones. Wherever found, these nodules contain only the head, never any part of the body, of the same kind of a fish, known to scientists as *Rhadinichthys*.

Recently Prof. A. O. Thomas, University of Iowa geologist, has extended the knowledge of the distribution of these brain-containing nodules by the discovery of specimens in Iowa. The brain is there exposed from the lower surface, enabling students of fish brains to record the nature of this unknown part.

Science News-Letter, January 26, 1929

Ultraviolet Light Affects Comets

Astronomy

Ultraviolet light from the sun, which causes sunburn and cures rickets, a disease of the bones of children, is also responsible for such different things as magnetic storms on the earth and the frequently erratic behavior of comets in the sky.

This was the belief expressed by Dr. E. O. Hulbert, of the Naval Research Laboratory in Washington.

Magnetic storms, which have no connection with the more familiar electrical storms, sometimes occur when the sun is especially active. They make themselves known by misbehavior of sensitive instruments in the magnetic observatories, and also by their effect on telegraph lines. Sometimes telegraphic communication between two places is completely impossible during such a magnetic storm, while at other times it may be possible to communicate for large distances without the aid of artificial batteries. Though it has been known that something happens on the sun which starts the storms on the earth, just what it was that came from sun to earth at the time has been a puzzle.

Dr. Hulbert answered this puzzle. “It appears to be a flash of ultraviolet light, coming from a hot spot—a little ‘volcano’—on the sun, that causes the observed magnetic storms on the earth,” he stated.

His researches clearly showed that such an ultraviolet flash could cause

this disturbance, by its effect on the magnetic condition of the earth, but he looked around for further proof.

This he found in the behavior of comets.

Comets do queer things sometimes, he pointed out. They may suddenly, within a few hours, grow a large tail, break up into smaller pieces, or even lose their tails altogether.

Perhaps these effects are also due to ultraviolet light from the sun, he thought. So he looked up the records of misbehaving comets, and, sure enough, he found that whenever a large comet had been on the same side of the sun as the earth, and had shown some erratic behavior of this kind, there was a magnetic storm recorded on the earth at very nearly the same time, so that now his theory seems to be rather close to the truth.

Science News-Letter, January 26, 1929

The electric pumps installed for draining Lake Nemi have been set to work and it is believed that the sunken galleys of the Emperor Tiberius will be revealed in about four months.

The average farm woman works eleven and one-half hours a day in winter and thirteen and one-half hours in summer, according to a home management demonstrator at the University of New Hampshire.

The Value of "Crank's"

Invention—Psychiatry

RUPERT T. GOULD in *Oddities: A Book of Unexplained Facts* (Stokes):

Of the many millions of fools who cumber the earth, I suppose that the fanatics, taking them all around, are the greatest nuisance—and, tested by old-fashioned notions of personal independence and "the liberty of the subject," the one most actively mischievous. Possessing, far too often, that misleading form of energy which it is fatally easy to mistake for capacity; restrained by no false modesty from minding everybody else's business; and simultaneously unbalanced and supported by a chronic inability to conceive that there can be two sides to any question, they are the bacteria of the civilized world—a fertile source of past, present and future disorders.

But if the fanatic, generally speaking, is an unpleasant figure, the harmless "crank" can be very amusing—provided that you merely chuckle over his lucubrations and sternly refuse to be drawn into correspondence with him. The latter caution is a *sine qua non*. He can never be converted from his mistaken notions, for the serene ignorance which gave them birth, forms also a mental armor proof against the clearest demonstration. In addition, he is generally of irritable temperament; he has much spare time; he is blind to the decencies of ordinary controversy, and he wields a vitriolic, if halting, pen.

Such is the flat-earther, the circle-squarer, the Ten Tribes man, the Jacobite, and the man who, measuring the Pyramids with a foot-rule (or, more commonly, relying on similarly accurate measurements made by other people) establishes to his own satisfaction that the early Egyptians were only a little lower than the angels and, possessed of an amazing and unsuspected amount of scientific and other knowledge, took the eminently reasonable step of declining to commit any of it to writing, leaving it to be deduced from the dimensions and orientation of various royal tombs (used in the monarch's lifetime as observatories).

Among this happy band (one can hardly add "of brothers," for in general one crank hates another most whole-heartedly) an honored place will, I think, always be found for the man who is convinced that he has discovered the secret of "perpetual

motion" (which, I ought perhaps to explain, happens to form the subject of this essay). That place is his of right, because, like the king, he never dies. He is always with us—and there are always a good many of him.

The reason is not far to seek. The necessary qualifications for a perpetual-motion seeker are few and simple. He must have a little mechanical skill—enough, say, for simple jobs about the house. He must have a little spare time and a certain amount of perseverance and self-confidence. And he must be ignorant, or all but ignorant, of two subjects in particular: the fundamental principles of mechanics and the works of his predecessors.

Of men of this type (the subject does not seem to have ever had much attraction for the other sex) there is always an ample supply—one might almost say a superfluity. And it is a curious feature of their unhappy obsession that it takes a variety of forms and directs their attention to several different objects.

Some, for example, consider that what is required is a clock that will never need to be wound; that such a clock will, in particular, be of the utmost value for finding longitude at sea; and that there is an enormous government reward on offer to its successful inventor. All three of these notions are baseless.

In the first place, many clocks have been made which do not require winding; their construction presents no great mechanical difficulty, and they can be fitted with any of several well-known systems of self-winding. They are mechanical freaks, and generally poor timekeepers. Secondly, to find longitude we merely need a time-piece which keeps accurate time—it does not in the least matter how often it has or has not been wound, except that in general the more often it is wound the better time it keeps. Thirdly, there is no government reward on offer for such a timepiece—or for any other form of "perpetual motion" machine.

Others of the fraternity propose to obtain "perpetual motion" by means of mills worked by tidal water or by fans placed in tall chimneys and exposed to a continual upward draught, or by various other applications of natural sources of power. Like the first class, such "perpetual motions"

are, if not common, at least far from unknown.

But the inventor who is at the same time nearest of all his tribe to the real idea of "perpetual motion" and farthest of all from realizing it in practice, is the man who attempts to make a machine which will give out more work than is put into it; one which actually creates energy and does not depend on external supplies of that useful commodity. Apart from occasional dabblings in hydrostatics and pneumatics, he generally looks to some application of gravity or magnetism for the mainspring of his machine, and he goes his way serenely unconscious of the fact that he is really doing his best to produce a working model of a contradiction in terms. He might not less usefully devote his time to drawing four-sided triangles.

Science News-Letter, January 26, 1929

Star's Heat—Continued
their temperature, he said, in telling of results.

"Mercury is certainly very hot and has little if any atmosphere. The maximum temperature is about 1300 degrees Fahrenheit. The distribution of radiation over its surface is much like that of the moon. Venus is covered with clouds and the radiation measured is from the high cloud surfaces and tells very little except by inference about the actual surface temperatures. The night temperature on Venus is much higher than that on Mercury or the moon, being about 9 degrees below zero Fahrenheit. The temperature on Mars varies greatly with the season and the time of day, but the temperatures there are somewhat like those on the earth, at least like those at very high elevations where the atmosphere is rare. The outer planets are very cold, as might be suspected from their great distances from the sun, unless they give off heat from their interiors. Not many years ago it was commonly supposed that Jupiter was warm, probably warm enough to give out some light of its own. The thermocouple measures show that this is not the case, and that the temperature of Jupiter is about 216 degrees below zero Fahrenheit."

Science News-Letter, January 26, 1929

The River Nile got its name from the Sanskrit word "nila" meaning "blue".

FIRST GLANCES AT NEW BOOKS

THE NATURE OF THE PHYSICAL WORLD—A. S. Eddington—*Macmillan* (\$3.75). When Dr. Eddington, the famous Plumian Professor of Astronomy at Cambridge, publishes a new book, the scientific world immediately takes notice. It knows in advance that it will be delightfully written, with a clarity and brilliance that is characteristic of the author. But this book even surpasses expectations. It consists of the Gifford Lectures, which he delivered at the University of Edinburgh in 1927 and, says the author, "treats of the philosophical outcome of the great changes of scientific thought which have recently come about. The theory of relativity and the quantum theory have led to strange new conceptions of the physical world; the progress of the principles of thermodynamics has wrought more gradual but no less profound change. . . . The aim is to make clear the scientific view of the world as it stands at the present day, and, where it is incomplete, to judge the direction in which modern ideas seem to be tending."

Physics

Science News-Letter, January 26, 1929

THE AUTOBIOGRAPHY OF AN AMATEUR INVENTOR—Frederic E. Ives—*Privately printed by the author, 1753 North Fifteenth Street, Philadelphia* (\$3). The personal recollections and opinions of a pioneer in applied science now in his seventy-third year. Giving an account of how the author inverted the process of half-tone photo-engraving and color photography and color printing. Full of interesting sidelights on American science and the psychology of invention.

Invention

Science News-Letter, January 26, 1929

THE TREASON OF THE INTELLECTUALS—Julien Benda, translated by Richard Aldington—*Morrow* (\$2.50). A vigorous protest against the post-war spirit of the times as shown in the exaggeration of patriotism, the cult of nationalism, the dominance of the state, the enforcement of conformity, the doctrine of liberalism, and the suppression of individuality. These are, he holds, contrary to Christianity and science, and he charges the thinkers in both fields with having betrayed their principles. The intellectuals of the day regard pacifism, cosmopolitanism, humanitarianism, and altruism as boring, and welcome war as a thrilling sensation.

Psychology

Science News-Letter, January 26, 1929

THE NEW MAP OF SOUTH AMERICA—Herbert Adams Gibbons—*Century* (\$3). Despite the interest in South America brought about by President-elect Hoover's recent trip, the average American is still inclined to regard the continent as a unit, without regard to the national distinctions that make it as heterogeneous as North America. In this book, Dr. Gibbons takes up each of the South American countries separately, and considers its geography, history, climate, people and general characteristics in a clear and vivid manner. Everyone who wants a clear idea of what South America is (and that should include every American) needs to read this book.

Geography—History

Science News-Letter, January 26, 1929

BEHIND YOUR FRONT—James Oppenheim—*Harper* (\$2). A few ideas from psycho-analysis, reduced to startlingly simple terms, Americanized, and in general organized into a light amusement for evening home reading. The author suggests that "If the reader plays this book through as though it were a game, he will find not only a new and rather surprising picture of himself, but also a psycho-analytical picture gallery of many notable people, from Charlie Chaplin to H. L. Mencken."

Psychology

Science News-Letter, January 26, 1929

THE FATS AND OILS—Carl L. Alberg and Alonzo E. Taylor—*Food Research Institute, Stanford University* (\$1.50). In this, the first of a series of "Fats and Oil Studies" of the Food Research Institute of Stanford University, two of the directors of the institute give a general view of the subject. The nature and sources of fats and oils, their properties, technology, production and consumption are some of the subjects treated.

Chemistry

Science News-Letter, January 26, 1929

GERMAN FREQUENCY WORD BOOK—B. Q. Morgan—*Macmillan* (\$.60). In order to determine what words should be introduced into the vocabulary of the learner of German, the order of frequency in current printed and written German has been determined for some 2400 words. This book is of interest to teachers of languages.

Etymology

Science News-Letter, January 26, 1929

MUSCULAR MOVEMENT IN MAN—A. V. Hill—*McGraw-Hill* (\$2.50). The book presents studies made on the chemistry that goes on in the body of an athlete. "The factors governing speed and recovery from fatigue" is the subhead of the book. Besides its value to scientists, the book might have an appeal to athletes with an inquiring turn of mind and enough chemistry to help them through the technical parts.

Physiology

Science News-Letter, January 26, 1929

GENERAL BIOLOGY—L. L. Burlingame and others—*Holt*. A second edition of a text by several members of Leland Stanford University, which has established itself as a proven success in its field.

Biology

Science News-Letter, January 26, 1929

BACTERIOLOGY: GENERAL, PATHOLOGICAL, INTESTINAL—A. I. Kendall—*Lea and Febiger* (\$7). Third edition of a standard book. A complete and solidly presented discussion of the science and practice of bacteriology, useful to the physician, the pathologist and the laboratory scientist.

Bacteriology

Science News-Letter, January 26, 1929

PLANT RESPIRATION—S. Kostychev, translated and edited by C. J. Lyon—*Blakiston* (\$2.50). In making available to English-reading plant physiologists this work of one of the most prominent of Palladin's students, Dr. Lyon has merited the thanks of his profession.

Plant Physiology

Science News-Letter, January 26, 1929

NEW WORLDS FOR OLD—R. G. Lunnon—*Methuen* (2/6). The new worlds within atoms and stars, the new knowledge of our earth's interior and its atmosphere, the notions of energy which link all these together; these are the new worlds described by Mr. Lunnon in this interesting little book.

Physics

Science News-Letter, January 26, 1929

THE BOY WHO FOUND OUT—Mary Hazelton Wade—*Appleton* (\$1.75). The story of Henri Fabre, told for young folk but not "written down" to them, so that it can be read with relish by anyone.

Biography

Science News-Letter, January 26, 1929

New Books—Continued

ORGANIC LABORATORY METHODS—Lassar-Cohn, translated by Ralph E. Oesper—*Williams and Wilkins* (\$6.50). A translation from a standard German work that, says the translator, covers the field better than any work in English. Its aim, he says, is to cite and outline the methods by which typical difficulties have been overcome, and leave their adaptation to the resourcefulness of the reader, so it is in no way intended for the beginner.

Chemistry

Science News-Letter, January 26, 1929

KITCHEN MANAGEMENT—J. O. Dahl—*Harper & Bros.* The author gives his views based on several years of practical experience as well as study. The building, equipping, arranging and managing of restaurant kitchens form the main theme. Food purchasing, dietetics and menu-making are discussed. The layman might be interested in some of the sidelights thrown on chain restaurants, cafeteria management, and duties of the personnel in the restaurant of his favorite club or hotel.

Economics—Dietetics

Science News-Letter, January 26, 1929

DISCUSSION OF THE NATIONAL ELECTRICAL SAFETY CODE—*Government Printing Office* (\$1). A publication of the Bureau of Standards that supplements the National Safety Code, and will be of interest to all electrical engineers.

Electrical Engineering

Science News-Letter, January 26, 1929

THE FATIGUE OF METALS—H. F. Moore and J. B. Kommers—*McGraw-Hill* (\$4). That metals get "tired" under use, and that failure of such parts under repeated stress is usually so sudden that it may cause a real disaster, has only been recognized in recent years, largely due to the work of Prof. Moore. In this book he and one of his colleagues summarize our present knowledge of the subject.

Engineering

Science News-Letter, January 26, 1929

THE BOSTON POST BOOK ON TELEVISION—Henry Milton Lane—*Boston Post* (\$.25). A thirty-five page pamphlet giving practical details on the transmission and reception of television. The amateur who wishes to experiment in this fascinating field will find a good introductory manual.

Radiovision

Science News-Letter, January 26, 1929

HAVE YOU A FRIEND IN ARKANSAS?

He would be glad to have a book on evolution which he could lend to his neighbor the preacher.

He might be able to come to the aid of a hard-pressed school-teacher or editor at the critical point in an argument.

Very likely he has children who will have to learn their science from half-muzzled teachers.

You are not in his predicament, but evolution is one of the most-discussed questions of our day.

Have you a good book on evolution and modern thought? Buy one of the books listed below!

<input type="checkbox"/> Evolution in the Light of Modern Knowledge; a Collective Work, New York, 1925.	\$7.50	<input type="checkbox"/> Lull, Richard Swann— <i>The Ways of Life</i> . New York, 1925.	\$3.00
<input type="checkbox"/> Brewster, Edwin Tenny.— <i>Creation</i> . Indianapolis, 1927.	3.50	<input type="checkbox"/> Mason, Frances, editor.— <i>Creation by Evolution</i> . New York, 1928.	5.00
<input type="checkbox"/> Conklin, E. G.— <i>Heredity and Environment</i> . Princeton.	2.50	<input type="checkbox"/> Mather, Kirtley F.— <i>Science in Search of God</i> . New York, 1928.	2.00
<input type="checkbox"/> Curtis, Winterton G.— <i>Science and Human Affairs</i> . New York.	3.00	<input type="checkbox"/> Newman, Horatio— <i>The Gist of Evolution</i> . New York, 1926.	1.50
<input type="checkbox"/> Darrow, Floyd L.— <i>Through Science to God</i> . Indianapolis, 1925.	2.50	<input type="checkbox"/> Newman, Horatio— <i>Evolution, Genetics, Eugenics</i> . Chicago, 1925.	3.50
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<input type="checkbox"/> Kellogg, Vernon— <i>Evolution, the Way of Man</i> . New York, 1924.	1.75	<input type="checkbox"/> Ward, Henshaw— <i>Evolution for John Doe</i> . Indianapolis.	3.50

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Young Criminals Not All Defective

Psychiatry

Boys of normal intelligence who go wrong commit crimes different from boys of lower mentality who become delinquent, according to an investigation of 200 boys who have appeared before juvenile courts in Ohio. One hundred of these law-breakers, all in their teens, were normally bright. One hundred were subnormal, though not dull enough to be called feeble-minded.

The normal boys committed chiefly crimes against property, such as stealing, burglary, forgery, and larceny, whereas the subnormals got into trouble more frequently on account of truancy and immorality, C. H. Calhoon, of the State Bureau of Juvenile Research, reports in the *Journal of Juvenile Research*.

Money, jewelry, automobiles and other property stolen or damaged by the normally intelligent boys amounted to more than \$158,000,

"Knockless" Gasoline

Engineering

Petroleum chemists of the United States are straining every resource to obtain "knockless" gasoline. They are succeeding, partly by carefully segregating naturally knockless stocks and partly by improvements in cracking processes, Dr. Gustav Egloff, Chicago chemist, told the recent meeting of the Independent Oil Men of America in Chicago.

But if automobiles were designed differently there would be no need for specially prepared knockless fuel. "It is well established that regardless of their type or composition, when a non-knocking condition exists in the motor, all gasolines burn with practically the same efficiency," he said. "There is scarcely one per cent. difference between the work, or the miles per gallon, which may be obtained from the noisiest straight run gasoline and the smoothest burning knockless fuel, so long as knocking does not occur. From this it is patent that the auto engineer should strive to design a knockless engine which will utilize all the energy of even our worst knocking motor fuels."

The difficulty is, that the greatest efficiency can be obtained from high-compression engines and high compression is what causes knocking. Hence the engineers have accepted it as an unavoidable evil, and are trying to adjust the fuel rather than the engine.

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whereas the mentally inferior boys caused only \$860 worth of property loss. Ninety-nine automobiles were stolen by the normally bright, whereas the subnormal boys stole only one. Altogether more than twice as many offenses were charged against the boys of normal intelligence as against the hundred who were mentally dull.

The evidence indicates that the bright child no less than the subnormal, may develop into a criminal if his environment and emotional make-up lead him that way, Mr. Calhoon concluded. His recommendation is that children who come into conflict with the law should be at once recognized as problems and steps should be taken to remedy their maladjustment, whether the child be normal or deficient in intelligence.

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History in Trees

Archaeology

A tree, certified by its rings to be 3,233 years old, probably the longest continuous year record in the world, has aided Dr. A. E. Douglass of the University of Arizona to construct what will soon be a record of climate, sun activity and weather extending far back into antiquity. Four trees, giant Sequoias of the Pacific Coast, each over 3,000 years old, have offered up their cross-sections for Dr. Douglass' study. Forty-nine other trees, most of them about 2,000 years old, are being measured. Trees' rings are being used by archaeologists co-operating with Dr. Douglass to date the ancient Indian ruins in the Southwest.

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Now Hairless Rabbits

Zoology

Russian hairless rabbits may yet appear on the scene, pursued by the already familiar—perhaps too familiar—Mexican hairless dogs. In the *Journal of Heredity*, D. A. Koslovsky, of the State Institute for Experimental Veterinary Medicine of Russia, tells of several hairless young rabbits that appeared among normal litters in hutches of his experimental animals. Some of them were partly clothed, having hair on their noses, ears, shoulder blades, and other bits of their anatomy. So far, however, all the hairless young ones born have died without issue.

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NATURE RAMBLINGS

BY FRANK THONE

Natural History



Crossbill

There is a pretty legend, in the minor key, about the crossbill. It tells that the little bird, seeing the suffering Christ on Golgotha, vainly strove to tear the nails out of his hands, and so got its beak bent out of shape and its feathers all stained red, and that these stigmata of its charity have remained with it to this day. It seems rather a pity to disturb so pious a fancy by stating that this apparently distorted beak is really a great advantage to the bird, because it is able therewith to wrench edible seeds out of the cones of evergreen trees, which other birds cannot reach at all.

As for its color, the legend might well be called on to account for that, for the bird is certainly red enough, except for its wings, which are black. The female, however, apparently was not privileged to receive this sanguinary baptism, for her feathers are a soft olive except, again, for the wings. There is another nearly related species, the white-winged crossbill, which has conspicuous white bars across the wings, and which is of a duller crimson over the body than the true red crossbill.

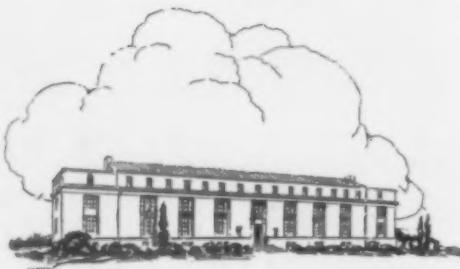
Both species are birds in which that gentlest of naturalists, Saint Francis of Assisi, would have taken great joy. They are gentle, quietly-behaved nomads, willing to work for their food, singing cheerfully though not ostentatiously, and avowedly having no regular homes. They would be Franciscan tertiaries, to be sure, for they do mate and rear offspring, but they seem to leave a great deal more to Providence than do most of our careful forest fowl, for their nests are turned up in all sorts of places and at any odd time in late winter or early spring, regardless of snow or sun.

Science News-Letter, January 26, 1929

TO THE SCIENCE CLASSROOMS OF AMERICA

From

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